SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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A GIANT OF THE ISLANDS

Tiny Tortoise Perched on Head of a Galapagos Giant

(See page 106)

Vol. XV No. 411

Twelve Hundred Rubber Plants

Botany

There are easily 1,200 species of plants in the world that have rubber in their veins, as Thomas Edison said in his recent birthday message. There are probably nearer 12,000 such species, if we take into consideration all that have even a little rubber. The problem is to make any of them pay, and especially to make any of those that are hardy in temperate climates into paying sources of the gum that bounces.

If Edison's hopes of establishing rubber plantations in the United States are to be realized, either hardy forms of the present rubber-yielding plants of the tropics will have to be evolved, or certain rubber-yielding plants native to the temperate zones will have to be bred up to a point where their rubber content will pay for its own extraction.

All the present rubber trees and vines are warm-climate plants. The Para rubber tree, Hevea, which now produces by far the larger part of the world's crop on the East Indian plantations, is decidedly a tropical form. It will just consent to grow in southern Florida, but will not grow for money unless it is permitted to hug the equator. It is out of the question for the United States proper, though it would thrive in the Canal Zone and the Philippines.

The original "India rubber" of the Orient was the product of a species of fig, the same tree used as an ornamental in thousands of apartments, and in larger size as a display piece in many greenhouses. This tree is slightly hardier than the Hevea, but is still very sensitive to frost, and could hardly be expected to pay its way even in the South unless new varieties better adapted to our climate can be produced.

Perhaps third in present importance as a rubber producer is the Madagascar rubber vine, related to our milkweed, which Mr. Edison is now trying out in the South. Even in the tropics it now produces only a small fraction of the world's rubber, but it might be exploited more advantageously by plantation methods and with more modern means of extraction than those now practiced in its native home.

In our own semi-arid Southwest, and more extensively in the adjacent states of Mexico, there is a native bush, the guayule, which contains rubber in paying quantities. It has the distinction also of yielding its rubber as tiny bits of the pure substance, not as a milky juice or latex which has to be given complicated and expensive treatments before it can be used. Guayule is now being cultivated by a corporation which has a large plantation in southern California, but even this native rubber plant requires the desert heat for profitable growth and holds out little hope of becoming adapted to the colder North.

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A Giant of the Islands

Zoology

There is a picture, entitled "Dignity and Independence," that used to be the delight of the late-Victorian drawingroom. It depicts a huge mastiff in his kennel, with a tiny terrier reposing between the big dog's paws. As striking and strange a contrast is afforded by a photograph made by the New York Zoological Society of one of their recently acquired giant tortoises from the Galapagos Islands, weighing 350 pounds, with a tiny three and three-quarter-ounce specimen perched on his head. Due to uncontrolled killing of these huge reptiles on their native archipelago, the species is in danger of extermination, so that it was thought advisable to send in an expedition to bring out as many living tortoises as possible, and establish breeding stocks at a number of tropical and temperate stations.

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North American Indians had no regular chimneys on huts or pueblos until the white man introduced this fashion.

A study of 5,000 negro school children from six to fourteen years of age, in a southern city, showed that negro girls after the age of eight or nine years are taller than negro boys up through the fourteenth year.

In This Issue—

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Instrument Shows "Movies" of Sun

Astronomy

By James Stokley

Great flames of gas, shooting out from the sun at speeds of 250 miles a second to heights of half a million miles. Solar whirlpools, with masses of hydrogen larger than the earth itself flowing into the sunspots with immense rapidity. For untold ages, such things have been happening on the sun, 92,900,000 miles away from you as you read this.

But not until a few years ago was man first vouchsafed a view of these happenings that would have taxed even Dante's imagination. The first man to see them was a quiet, mild-mannered gentleman of Pasadena, California—Dr. George Ellery Hale, well-beloved honorary director of the Mt. Wilson Observatory of the Carnegie Institution of Washington. As a result of his labors hundreds of other people have seen these same effects. Duplicates of his instruments are being placed in observatories throughout the world, amateur astronomers are making the equipment with which to make such observations, and before long there will be such a continual watch of the doings of the sun as that orb never before experienced.

Dr. Hale occupies a unique position—not only in astronomy, but in the general field of scientific research as well. The son of a wealthy Chicagoan, he early became interested in science and was provided with telescopes and microscopes. But unlike most boys that are so fortunate, he soon became interested in the investigation of the things he saw—not merely in looking at them, exclaiming with wonder at their beauty or curious appearance, and then passing on to something else.

Recently he told the members of the Astronomical Society of the Pacific, through their publications, how he became interested in the sun.

"I was fascinated by the marvelous views of rotifers and other infusoria under my microscope," he said, "but I wanted to investigate them and I did not know how to go about it. I did contrive to couple my telescope with a camera, and thus make photomicrographs of various objects, but this was not research. I collected fossile from the limestone rocks that filled the breakwaters of Lake Michigan, and so became interested in evolution, but I did not see how I could add anything of importance to its study. My books told me how to make this and that experiment in chemistry and physics, and no one could enjoy them more than I did. But what I wanted was a description that I could follow of a connected series of experiments, leading step by step to the development of some branch of science and giving a clue to the nature of research.

A SOLAR PROMINENCE, or great flame of hydrogen, that shot out from the sun and was photographed with the spectro-heliograph at the Mt. Wilson Observatory. Dr. Hale's latest invention makes these visible to the eye. The white circle represents the size of the earth on the same scale

"My microscope, however, had taught me two of the most important principles underlying original research: first, that invisible worlds, full of the most beautiful and intricate phenomena, lie all about us, offering endless possibilities for investigation; and second, that special instruments and methods may be devised for rendering them accessible to study. Thus I was prepared, when I improvised my first telescope, to appreciate a little more clearly the steps open to the investigator.

"When I had finally obtained a 4-inch telescope, and mounted it upon a heavy brick wall so that it projected above the roof of the house and afforded an unobstructed view of the sky, I was delighted with all that it showed me. But after observing night after night the long range of celestial objects and finding them (as it seemed) so completely described in my books, the desire to learn something new and the need of a guide became more insistent than ever. It was evident that photography offered limitless opportunities, and as my telescope had no driving clock, I first tried my hand on the sun. About this time I began to read of the spectroscope and to perceive dimly that of all the allies of the astronomer this comparatively new instrument, if aided by photography, offered more promise than any other.

"Even now I cannot think without excitement of my first faint perception of the possibilities of the spectroscope and my first glimpse of the pathway, which rapidly became clearer, thus suggested for me."

By 1890 he had graduated from Massachusetts Institute of Technology and returned to Chicago, where he had a private observatory, known as the Kenwood Observatory, at which some of his most important work was done. Here he invented the spectro-heliograph, forerunner of his latest instrument, and by which, for the first time, it was possible to photograph the sun in the light from a single element.

A few years later the University of Chicago was about to start a great new observatory, with the world's largest telescope, using funds provided by Charles T. Yerkes. Dr. Hale was selected to organize and serve as first director of this now world-famous Yerkes Observatory. As a result of his success there, when the Carnegie Institution, in 1904, decided to found a great observatory chiefly for the study of the sun, Dr. Hale was again selected as the organizer and first director. From this has arisen the great Mt. Wilson Observatory, perhaps the best-known in the world, and with the largest telescope.

When the World War came, and when our nation was involved, Dr. Hale's organizing abilities again served in good stead in the formation of the Council for National Defense, now the National Research Council, which is the central body for the organization of scientific research throughout the country. Largely due to his unceasing labors during the war, his health broke down after the conflict was over, and finally he had to retire as director of the Mt. Wilson Observatory. He was made its honorary director.

But even retirement could not stop such an active brain, and in recent years he has continued to assist astronomical work in (*Turn to page* 109)

"Movies" of Sun—*Continued*

DR. GEORGE ELLERY HALE, founder of two great observatories and inventor of the spectroheliograph and, now, the spectrohelioscope

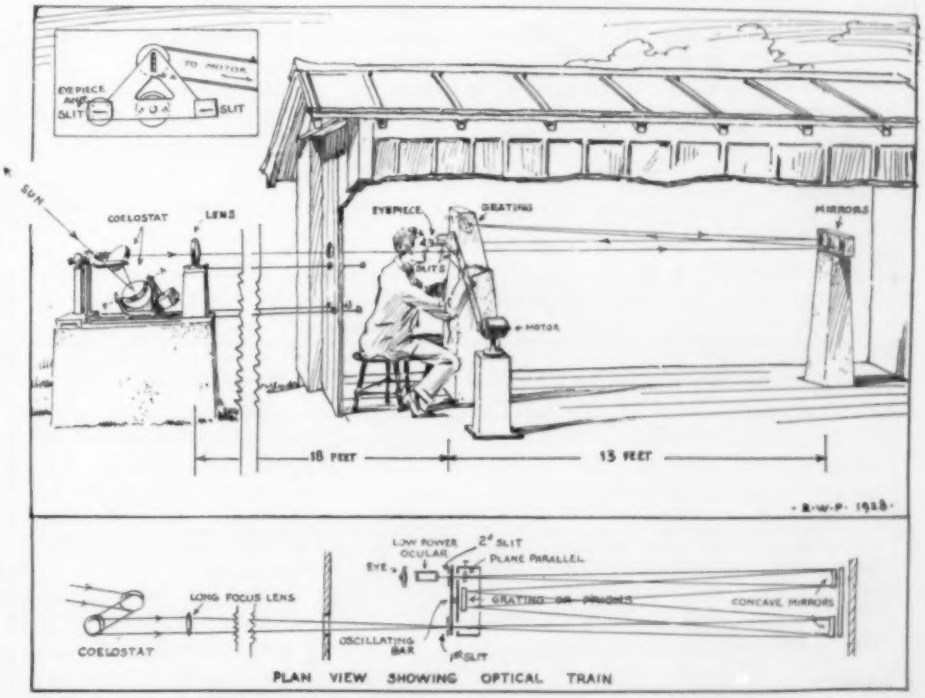
many ways. The announcement was recently made in the papers that a new astronomical telescope, with a mirror 200 inches in diameter, four times the area of the present champion at Mt. Wilson, was to be made for the California Institute of Technology, close neighbor of the Mt. Wilson Observatory at Pasadena. It was announced that the International Education Board would provide the funds, running well into the millions. But the name of the man who has successfully brought this project to culmination was almost overlooked. That name was George Ellery Hale. Now active design of the new telescope has begun, and still his is the guiding spirit behind it.

It was the sun with which Dr. Hale began his serious scientific work, and on which he has shed so much light, so it is appropriate that over the entrance to his private laboratory and observatory in Pasadena there should be a representation of the Egyptian sun-god, suggested, perhaps, by his close friend, Dr. J. H. Breasted, famed egyptologist of the University of Chicago.

This private workshop is the scene of the invention of the spectrohelioscope, with which it is possible to see "movies" of the sun. Everyone knows how a prism breaks up a beam of white light into its component colors and forms a spectrum. Not quite so many people know that the same thing is done by a piece of polished metal on which are ruled fine lines, thousands to the inch. The astronomer calls this a diffraction grating, or simply a grating. When the light from the sun is passed through a narrow slit, then through the proper lenses to a grating or prism, and the resultant beam of colored light is examined by other lenses, the colored spectrum is seen, crossed by numerous dark lines.

If this same combination of prisms and lenses, which is called a spectroscope, is used to examine the light from white hot metal, such as the filament of an electric light, the colored spectrum appears, but the dark lines are absent. This is called a continuous spectrum. Still a third kind can be obtained from the bright yellow light that appears when a pinch of salt is dropped into the blue flame of a gas range. The spectroscope shows this yellow light from salt to consist only of yellow. Its spectrum is merely a pair of bright yellow lines, very close together, against a black background. It is called a bright line spectrum, and is due to the glowing vapor of sodium, one of the two elements that make up ordinary table salt. Potassium, present in caustic potash, gives a bright violet line, and the different elements have their own characteristic bright line spectra.

Suppose now that you have a spectroscope and are looking at the spectrum of the sun and the sodium light at the same time, and have it arranged so that the two spectra are side by side. Then it will be found that in the yellow part of the solar spectrum there are two dark lines, and that these exactly coincide with the two bright yellow lines of the sodium spectrum. If the light from an electric light filament is passed through a flame of burning sodium, the same two dark lines appear. This shows that glowing sodium vapor not only gives off yellow light of its own, but that when brilliant white light, consisting of all the colors, is passed through it, the same part of the yellow light is removed. The sun is thus shown to consist of an inner glowing mass, which would give a continuous spectrum, if we could see it, surrounded by a layer of glowing gases, which absorb certain parts of the light and cause the dark bands. If this were the case, the outer layer by itself should give a bright line spectrum. Just at the beginning or end of a total eclipse of the sun, the dark moon covers up (*Turn to next page*)



HOW THE SPECTROHELIOGRAPH WORKS. The light from the sun, after passing through the lens and slit is broken up by the grating into a spectrum. When the slits vibrate, the surface of the sun can be watched in the light of a single element. (From drawing by Russell W. Porter for "Amateur Telescope Making." Reproduced by courtesy of Scientific American Publishing Co.)

Solar Movies—*Continued*

all of the sun but a part of this outer layer, and that time its spectrum does appear as a host of bright lines.

This outer layer is called the chromosphere. Ordinarily it is in a rather quiescent state. Gravity, of the great solar mass, tries to pull it inwards, but there is so much light leaving the sun, that it exerts a pressure outwards, the two practically compensate for each other. Sometimes the radiation of light from one part of the inner layer may increase, and the glowing gases of the chromosphere may be thrown outwards for great distances—even to half a million miles or more. When this takes place, we have what is called a prominence.

Though prominences of the sun are frequently occurring, they are invisible to the unaided eye, or even when one looks through a telescope, equipped with the darkening equipment that makes looking at the sun a safe pastime. The reason for this is that they are so much fainter than the bright background. During a total eclipse, the moon just covers the bright area of the sun, and then, if there are any prominences they will be easily seen.

But there is another way of seeing them, and one does not need an eclipse to do it. If the light from an incandescent lamp, that gives a continuous spectrum, is passed through a powerful spectroscope, the spectrum is spread out much more than with a smaller instrument. As the same amount of light must cover a much larger area, the spectrum through a large spectroscope is much fainter than through a smaller one, if the light source is the same in each case. With the sodium light the case is different. The two lines are seen through a small instrument at just about the same brilliance as with a large one, though farther apart. The reason for this is that the sodium light is entirely of a single color—yellow. The spectroscope breaks light composed of several colors into bands of each; light already consisting of a single color cannot be broken farther.

This was the principle first used to reveal the prominences without an eclipse. By passing the light from the edge of the sun, where the prominences are best seen, through a spectroscope of high power, the light from the inner part of the sun is spread out into a very faint spectrum, but the light of the prominence itself goes through uidisturbed. The glare of the background is no longer so great that it drowns out the fainter glow of the prominence. This sort of a spectroscope only (*Turn to page* 117)

Tariff Increases Foreseen

Sociology

Though the tariff hearings now going on before the House Ways and Means Committee were allegedly called for the purpose of giving the farmers a chance to present arguments on behalf of raising the tariff on farm products, Eastern manufacturing interests have presented so many scientific and technical arguments in behalf of raising tariffs also on certain textiles, metal goods, bricks and cement, it is virtually certain at this time that upward revision on these latter items will take place.

In fact, it may be said that these Eastern manufacturing interests have presented much more convincing data than have the farmers. The agricultural interests, with the exception of certain professional leaders, have contented themselves with general statements, and have reiterated the old argument that it is well known that the farmer buys in a protected market and sells in a free market.

However, the agricultural items are slated for general revision upward, though the increases may not be so large as those asked.

All fruits and vegetables are expected to receive more protection; the sugar tariff will be given a boost; likewise probably milk and milk products, meat, vegetable oils. It is believed unlikely that the tariff on wool will be raised. Hides are doubtful.

Certain opposition to increasing duties on some of the farm products has been presented to the committee. For example, clothing manufacturers opposed more tariff on wool; paper manufacturers do not want higher duties on casein; manufacturers of shoes look with disfavor on increases on hides; soap manufacturers declare that higher duties on palm and coconut oils will raise the cost of soap and laundering by some fifty per cent.

The whole range of economic thought, always opened up when the tariffff is under discussion, has furnished the basis for many arguments.

Indirect protectionists have advanced the theory that the people of the United States can be made to eat more apples and peaches if tropical fruits, like bananas, are kept out.

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The corner stone of the new Department of Agriculture building was laid by Secretary of Agriculture W. M. Jardine, in January.

A Pittsburgh blacksmith has found a novel use for radio: it keeps the horses quiet while he works with a new shoe.

Babylonians Were Weather Men

Meteorology

The reputation of the ancient inhabitants of Mesopotamia as the earliest and greatest students of the stars is called in question by Prof. Eckhard Unger of the University of Berlin, who states that they paid a great deal more attention to meteorology than they did to astronomy. They even laid out their compass according to the winds rather than according to the stars, he declares.

The Babylonian temples and city streets were not oriented on a north-south and east-west system, as most human works have always been, he states. The cardinal points of the Babylonian compass were the "quarters" of ours: northwest, northeast, southeast and southwest. These directions agreed with the prevailing winds. The northwest wind brought clear, dry, bracing weather, and was known as the "favorable wind." The northeast wind was called the "mountain wind" because it blew chill from the Asiatic mountains. The southeast wind, blowing up from the Gulf of Persia, brought damp and drizzly weather; the Babylonians did not like it and called it the "cloud wind." The wind they most dreaded, however, came from the southwest, from out of the desert, bringing burning sandstorms. They called this the "storm wind."

When they laid out their cities on the rivers, Prof. Unger says, they did not adapt the street directions to the direction of the stream, but rigidly stuck to their wind-compass, facing their walls to the four cardinal points as they conceived them and the corners of the city to the cardinal points as we know them. They even carried their meteorological notions into the heavens, and divided the moon into quarters which they named after the earthly winds.

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More Mental Doctors

Psychiatry

A great shortage of physicians who are familiar with psychiatry exists in the United States, according to recent testimony of Dr. William A. White, superintendent of St. Elizabeth's Federal Hospital for the Insane, before the House Committee on Appropriations.

The number of physicians in the country, Dr. White said, approximated 149,000, of which only 2,000 were thoroughly familiar with the treatment of mental diseases.

Against this figure, he puts the fact that "there are 800,000 beds in all the hospiitals of the country. Four hundred thousand, or one-half of these, are in mental-disease hospitals."

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Pet Squirrel A Mouser

Zoology

A golden-mantled ground squirrel, tamed by rangers at the Dunraven Pass Station in Yellowstone National Park last season, not only made an excellent pet but also took upon himself the duties of mouser. At first considerable local comment was caused by the fact that the squirrel, known as Chippie, had caught a mouse; but Ernest Thompson Seton, well-known naturalist, states that this species of squirrel, which is really a rodent, is in the habit of catching field mice. Therefore the step to catching a mouse indoors was not such a long one for Chippie.

Chippie made a great hit with the Dunraven rangers. "Chippie has proven quite a bit of company to me," said one of them. "He will come when I call him if he is within hearing distance. He shows no fear of me at all unless I make a very sudden movement.

"He is as jealous as he can be and will not allow me to feed another squirrel at all. He will chase them out of my hand, then sit up there and chatter at them to let them know their place."

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A new type of radiator with unusual powers of heat conduction is only about one-fifth the size of radiators in general use.

A Sanitary Tragedy

Hygiene

Quotation from *Science Progress* (Vol. XXIII, p. 143):

E. A. Seagar reports a very unhappy circumstance in the *Journal of Tropical Medicine and Hygiene*, March 1, 1928, namely the entry of malaria into Barbados. Hitherto the disease seems to have been entirely absent there. and the case is similar to that of the entry of malaria into Mauritius in 1866. One would have thought that the local authorities would have taken more care regarding the entry of dangerous mosquitoes, but we suppose that the same thing that happened there has happened in most British possessions, where mosquitoes are apparently allowed their freedom without let or hindrance. Thirty years have now elapsed since the mosquito theory of malaria was fully established, and yet we hear that the insects abound in most British colonies as much as they do in many other places. The authorities always seem to think that the disease malaria does not cost them anything. It generally doubles the death-rate or more, as well as being an enormous tax on agriculture. Really, it is time to ask whether the British nation would not do well to hand over all tropical colonies to the United States, who certainly show some intelligent interest in this matter. Now, in future, the Barbados Government will be forced to pay considerable sums in consequence of this new plague which has been allowed to enter the colony, and apparently it is scarcely possible to eliminate the disease altogether in future after entry. I have always maintained that antimalaria sanitation is the principal test of efficiency in any local government.

Man-Made Lightning Out of Doors

Physics

Man-made lightning has now left the laboratory and gone out of doors to compete with the natural article in testing electric lines. This announcement was made by the General Electric Company in revealing the first details of experiments that have been made by their engineers in the Berkshire mountains in northwestern Massachusetts.

The apparatus was mounted on a small truck, and placed at the base of one of the tall transmission towers. Outside the truck a spark gap consisting of two brass spheres was used, and from this wires led to the overhead spans. When the engineers operated the apparatus, a bolt of hundreds of thousands of volts of electricity, with all the characteristics of lightning, was sent over the lines to be recorded with a special camera operating in a millionth of a second. The records were made five or ten miles away, at Pittsfield, where the power from the Turners Falls Power and Light Company is received over the lines for distribution to the city.

Lightning, enemy of electric transmission, has been studied by electrical engineers ever since man started, a half century ago, to transmit power over wires. Today lightning is still the major source of interruption on transmission lines, but the engineers are continually developing new tools and methods of attack so that the chances of designing a lightning-proof line become better each year.

Artificial lightning generators capable of producing a half million volts were made years ago. A million volts were attained shortly thereafter, and a few weeks ago, the goal of 5,000,000 volts was reached in Pittsfield laboratory experiments. Use of such equipment led to the discovery of many additional facts about lightning voltages, but the work necessary was confined within the laboratory.

Work with actual lightning on high-voltage transmission lines was started last year, and, during a thunderstorm in the foothills of the Allegheny Mountains last July, General Electric engineers obtained a cathode-ray oscillogram or picture with its high speed camera showing the effects of a natural stroke of approximately 2,500,000 volts on the transmission wires. But lightning refuses to sit for its picture when and where desired. Obtaining the one record was a considerable achievement.

Having obtained one record of an actual lightning bolt and its effect on a transmission system, it became possible for engineers to duplicate the performance at will. Lightning characteristics had been determined, and it remained only for the investigators so to arrange their high-voltage generators that, on a smaller scale, the same type of discharge could be produced when and where desired.

Construction of a portable impulse generator then made it possible to apply surge voltages at different places along the Turners Falls Power and Electric Company lines. Approximately 40 miles long, and extending from the Connecticut River to Pittsfield, the lines were built for 110,000 volts and are carrying 66,000. The impulse generator is so constructed that the engineers have available short or long waves, and either high or low voltage.

In the early days of electricity it was customary for generating stations to be crippled during thunderstorms, and most houses had combination gas and electric fixtures, and possibly also a supply of oil lamps and candles for emergencies. Such provisions are hardly necessary today, for engineering investigations have shown how to build lightning arresters that will protect equipment against the surges caused by lightning. And the work that is being carried on today is bringing nearer that day when interruptions will be even more infrequent.

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Worms on Diet Tempt Fish

Biology

Worms placed on a scientific diet before being used as bait are more attractive to fish, than those just taken from the ground, experts of the U. S. Department of Agriculture report, and the formula for this process, known as "scouring," has been made available by the Bureau of Entomology.

According to W. R. Walton, a distant relative of the famous Izaak Walton, known as the patron saint of fishing, the worms should be placed in a container filled with moistened moss for three or four days prior to being used. Sphagnum moss, found in damp woods throughout the northern states, is preferable, but other varieties may be used.

If the worms are kept for longer than that period the diet should be varied with sweet milk every week, and the moss should be washed every ten days. At the end of a few days they become pink in color, and for some unexplained reason make the fish bite much quicker. The worm is transparent and the contents of the stomach can be seen through the skin, and the dieting process makes them of an even color which the fish regard as a choice morsel. The "scouring" process is particularly valuable for game fish such as trout, and it makes the worm more lively, tougher and easier to handle, Walton has found.

He has just published the results of a study of methods of preventing the worms from damaging lawns and golf courses, and stresses the fact that he is merely repeating an old formula given by his famous relative in 1653, as a matter of convenience for fishermen.

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Kish Traced to 4000 B. C.

Archaeology

Seven stages of human history, starting as far back as about 4200 B. C., have been traced at the ruins of Kish, most ancient great capital of Asia. A report just received at the Field Museum from Prof. Stephen Langdon, director of the Field Museum-Oxford University Joint Expedition to Mesopotamia, shows that the excavations have penetrated to virgin soil.

In the lowest level of the buried city have been found painted pottery and a large number of tablets covered with picture writing. Crude as these pictographic inscriptions are, they can be translated as Sumerian and they show that the founders of Kish were Elamites. From the depth of the soil in which the tablets and pottery were lying, Professor Langdon concludes that civilization got a start here at a period before 4000 B. C.

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Duplicates Plane's Motion

Aviation

A device that simulates actual flying conditions and produces the psychological effect to the beginning airman of an airplane in motion has been developed at the Wright Field Experimental Flying Station after almost a year's tests, it was revealed today by Lieut. Albert I. Hegenberger.

As yet without a technical name but known temporarily as an "orientator" or apparatus designed to accustom the novice to the feel of the plane, the new invention is producing excellent results and when further perfected may entirely take the place of the "Ruggles" orientor, the standard device of the same general nature that is in wide use today.

At a casual glance the "orientator" looks very much like the Ruggles apparatus since it is about the same size and is used in a like frame. However, it has certain marked and revolutionary differences, Lieutenant Hegenberger explains. Whereas the former device is able to simulate the control apparatus of a plane and contains the actual cockpit, it has neither propeller nor engine. But the new "orientator" has all these things and is thus able to give all the plane's basic movements, such as an up and down lift, a left and right stability, the roar of the engine plus the attendant strong blast of air, and precisely the same loops and turns as are made by an actual plane in the air. In addition the "orientator" is equipped with a regulation aeron or moveable flat foil that serves to keep the ship from wobbling from side to side. The apparatus is electrically controlled and the bulk of it is covered with a fabric very similar to that ot a plane.

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Measures Speed of Birds

Ornithology

Prof. Thienemann of Rossitten, East Prussia, gives the following as the established speeds of certain birds during migration: The sparrow develops a speed of 25 miles per hour; the gray gull, the black-back gull and the Norway crow have the same speed, 31 miles per hour. The rook and the finches reach 32 miles per hour. The speediest flier is the starling, with approximately 45 miles per hour.

Science News-Letter, February 23, 1929

Paper that will not burn is an invention of a German chemist.

Television Prefers Red-Heads

Radiovision

Red-headed people are the best subjects for television, while blondes, in general, are the poorest. This curious fact was brought out by V. A. Schoenberger, Chicago radio engineer, in addressing the Federal Radio Commission, during the hearing on the advisability of allowing television transmission by stations in the broadcast band.

The broadcasting stations themselves and their public, and not the Radio Commission, are the best judges of whether television broadcasts are of interest and value, the Commission was told by Dr. Lee De Forest, radio pioneer and inventor of the vacuum tube detector and amplifier. He said that after the war-time restrictions on radio were removed in 1919, he began sound broadcasting on a small scale. He subsequently moved his station and the radio supervisor for the New York district took advantage of a technicality and suspended his license. To Dr. De Forest's protests he replied that "entertainment by radio had no place on the ether."

"The Radio Commission should not repeat this early policy of discouragement, but should give television all the encouragement possible," Dr. De Forest said.

Similar views were expressed by C. Francis Jenkins, Washington inventor, who urged that radiovision should be allowed on broadcasting wavelengths. He stated that his own experience, in broadcasting radio movies from his Washington station, had shown that entertainment comparable with that provided by the animated cartoons of the motion picture theaters could be transmitted by radio. Further, he stated, it could be kept within the ten kilocycle width of band allotted for ordinary broadcasting stations. The importance of broadcasting on a frequency between 1500 and 550 kilocycles, that of the broadcast stations, came from the fact that millions of people are equipped with radio sets capable of tuning in these waves, and would have to buy a minimum of new equipment. Only by learning of the actual experience of the public in receiving such programs can the greatest progress be made, he said.

A diametrically opposite view was expressed to the Commission by Julius Weinberger, engineer of the Radio Corporation. He stated that successful commercial television involved the transmission of distinct images of at least two human figures, and that a crude reproduction of a single face did not come within the qualification. This requires a band of 100 kilocycles, at least, he continues, and should not be placed in the broadcast band, but in the high-frequency, or short wave, band.

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Cleopatra Had Eyebrow Pencil

Archaeology—Pharmacology

The very paints with which Cleopatra goo-gooed her eyes and painted her face to make an easy mark of Antony, some three thousand years ago, are yet used in the preparation of eyebrow pencils and face pastes, Prof. Ivor Griffith told an audience at the Philadelphia College of Pharmacy and Science. Al-Kohl, the Arabian name for this three-thousand-year-old product, is the forerunner, in name at least, of the Volsteadian unutterable alcohol.

"Various reasons have been given by writers and historians for the fall of Rome," said Professor Griffith, "but no one has heretofore suggested that the perfumed baths of her later luxurious days and the enervating attentions paid to beautifying the outer instead of the inner man sapped the virility and vitality of the once business-like soldier of Rome whose courage extended the Empire of that great city to every corner of the earth."

However, the current cosmetic craze of America, which cost $177,000,000 in one year, is not likely to result in the downfall of this country, Prof. Griffith explained.

"For here is a real democracy of paint and cream and powder. Rich and poor alike enjoy the blessings and suffer the pangs of external decoration. Only the rich in Rome and a favored few in France could afford the joy of perfumed bath and spiced ointments, but in America these commodities, good and bad, are within the reach of every current Cleopatra."

The historics of cosmetics are entertaining, but the hysterics are much more so, Prof. Griffith pointed out, referring to the hundreds of dangerous and deceptive products purchased indiscriminately by persons ignorant of their chemical composition. Responsible manufacturers do, however, produce worthy and harmless adorning cosmetics, he stated.

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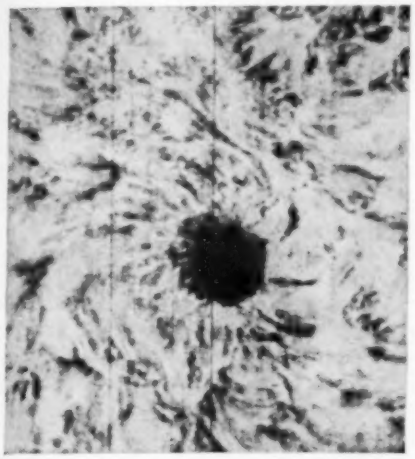
Solar Movies—*Continued*



A SOLAR TORNADO, like this, surrounding a sunspot, can now be seen with the spectrohelioscope, and the flow of the hydrogen actually watched

shows a tiny bit of the sun at a time. In order to reveal the entire sun in the light from a single element in the chromosphere, Dr. Hale invented, in 1895, the spectroheliograph. In order to get a good spectrum, the light must first be passed through the narrow slit. The image of the sun, as formed by a large telescope, may be several inches in diameter, and so the slit cannot take in more than a very small slice of the sun at a time. But if the slit is as long as the diameter of the solar image, and is moved in the direction at right angles to its length, then the entire sun may be covered.

One moving slit is not sufficient, for when it moves, the spectrum, on the other side of the prisms or grating, also moves, and all that the observer sees is a spectrum, with its various lines, passing across the field of view.

Suppose that you want to examine the sun in the light of the red glow of hydrogen. The first slit is not in the middle of the sun, and you look, through an eyepiece, at the dark red line of hydrogen in the spectrum. Now suppose that you have a second slit, just the width of this line, and you adjust it so that all of the spectrum, except the line itself, is cut off. Then you will see that the line is not dark, but has a faint red light of its own. Now move the slit under the solar image. This will move the red line, so you more the second slit, and make it follow the line. To save trouble, you attach a motor, and the proper gearing to the two slits, so that they both move across the sun at exactly the right speed. Instead of looking at it with (*Turn to next page*)

White Hair Runs in Family

Genetics

When young Ann complains that her hair is turning gray Aunt Ann may remind her that it runs in the family to get gray early in life. She will be stating a scientific fact, in all probability. Prematurely white hair does seem to run in families. A family in which prematurely white hair occurred in five generations has just been reported by Humphrey J. H. Hare of Emmanuel College, Cambridge, England, in a communication to the American Genetic Association:

"The abnormal persons show no abnormality until they reach the age of seventeen or eighteen," reported Mr. Hare. The hair turns slowly white and by the age of twenty-five has completely lost its color. In every instance the abnormal individual has had one abnormal parent. Mr. Hare explains the case by the assumption that the abnormality behaves as a simple Mendelian dominant. In other words the tendency to have white hair at the age of twenty-five may be inherited like blue eyes or the shape of the nose. Over half the members of the family during five generations had the abnormality.

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Moon Like Volcanic Ash

Astronomy

Whatever the moon consists of, it is some very porous material similar to volcanic ash on the earth, and not at all like any solid rock of which we know.

This was the announcement made by Dr. Paul S. Epstein, of the California Institute of Technology, using data furnished by measurements of the moon's temperature during a recent lunar eclipse by Dr. S. B. Nicholson and Dr. Edison Pettit, of the Mt. Wilson Observatory.

A mathematical expression of the way the moon cooled when it entered the dark shadow of the earth, and so received no heat from the sun, gave the value of 120. Dr. Epstein made similar measurements in the laboratory of the cooling of various materials. Granite gave a value of 16, which meant that it cooled more slowly. Basalt gave 24, and quartz sand 58. Pumice stone, however, gave values of between 100 and 150. As pumice is of volcanic origin, this appears to be new evidence in favor of past volcanic action on the moon, which may have formed the craters.

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Nature Ramblings

By Frank Thone

Natural History

Partridgeberry

Of late years florists and street hawkers have been offering decorative trailers of little green leaves, interspersed with pairs of bright red little berries, and these "greens" have become quite popular as table decorations during the winter. It is an ungrateful task to have to keep saying "stop"; but unless the American public goes a little slow on the partridgeberry its children will have to get along with just one less attractive ornamental ground-covering vine in the woods. There is still plenty of this plant left, but there won't be long if the demand keeps on pressing the trade.

It would be a pity to see the partridgeberry vanish. It is such a pretty thing, with its hardy evergreen leaves brightened with whitish veins, its pairs of tiny white flowers in the spring and its twin berries (another name for it is twinberry) in the autumn and winter. It would be better to coax it into growth in parks and on large timbered estates. For it has the great virtue of being able to grow on acid soil under the shade of trees—a situation little to the liking of most low-growing plants of possible use as ground cover.

It is easily satisfied in the matter of climate, too, for its natural range runs from Nova Scotia to Minnesota on the north, and sweeps southward to Florida and Mexico. A second species is found in Japan.

The botanical name of the genus is *Michella*. This is a monument to friendship between an American and a Swedish scientist a couple of centuries ago. For Linnaeus named the plant in honor of his fellow-botanist and correspondent, Dr. John Mitchell, of Virginia.

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Solar Movies—*Continued*

the eye, you place a photographic plate right back of the second slit, and so you get a picture of the sun, made entirely in the red light of hydrogen, made up of a vast number of tiny slices.

This is the spectroheliograph, first great invention of Dr. Hale. It has been used constantly at a great number of observatories in the last thirty years.

However, it has one disadvantage. An exposure may take several minutes. The astronomer cannot watch the sun while he is taking it, and so he has to shoot more or less blindly. There may be something interesting happening on the sun at the time, or again there may not be. What was needed was a method of actually watching the sun in the light of a single wave-length. To do this, Dr. Hale invented the spectrohelioscope, the name of which simply means that it is an instrument to see the sun with the aid of its spectrum. In this device, the two slits oscillate back and forth so rapidly that when the astronomer looks at the second slit through an eyepiece, he sees a large area of the sun. It can be arranged to show the entire sun at once, but in its usual form it only shows a piece of it, on a larger scale than could be seen with the whole solar disc. Though this might seem like a simple and obvious development of his earlier instrument, there were a number of difficulties to be overcome before it could be successful, but now that they have been surmounted, the spectrohelioscope is now taking its place as the latest addition to the battery of eye aids of the astronomer.

In fact, so much has the spectrohelioscope, with the sun telescope to go with it, been simplified, that it is now being manufactured for a cost no greater than that of a small automobile. Anyone with a little mechanical skill can make one at a cost comparable with that of a good radio set. Now Dr. Hale is interested in getting a great body of amateur astronomers at work with such instruments so that someone will be sure to be watching the sun at every moment. It is not hard to operate, and anyone who can give a little time regularly to observe the sun with it may be able to materially advance the astronomers' knowledge of this source of all our energy. And even if one can't do this, he will be sure of an interesting and fascinating study that will give him a new idea of some of the marvels that are taking place in the world about him.

Science News-Letter, February 23, 1929

Politics Determine Chinese Health

Hygiene

In China every known disease exists, and floods, wars and famines are common. But the political and economic situation affects the people's health more than any of the diseases, in the opinion of an official of the U. S. Public Health Service, who has recently returned from China. Ignorance and terrific poverty are, of course, responsible for the prevalence of tuberculosis, smallpox, cholera, intestinal diseases and diseases resulting from faulty diet.

Sanitation in the Western sense is completely lacking for all but the wealthy Mandarin class. In fact, vast numbers of the Chinese population have not even a roof to cover them while they sleep, or to protect them from the elements. Their entire property consists of the rags they wear as clothing. The rickshaw coolies, hot and sweating after their last run, have nowhere to sleep at night but the pavement. Such exposure combined with underfeeding makes tuberculosis especially prevalent among them.

The use of human excrement for fertilizer causes great prevalence of diseases like hookworm, dengue, dysentery and typhus, which are due to bacteria and parasites of the intestines. No foreigner dares to eat uncooked food in China. Salads of raw lettuce, celery, tomatoes, etc., are so dangerous as to be prohibitive. In spite of all precautions, foreigners nearly always get dengue fever if they are in the country for any length of time.

A fungus infection of the foot, known as Hong-kong foot, is very common. It is spread by the barefoot coolies, but shod Mandarins and foreigners also acquire it.

The civil wars are, of course, responsible for great loss of life. This is due not so much to the numbers killed in battle as to the starvation that results when all the able-bodied men of a large district are called from the fields to the armies. Crop failure is the first consequence and famine the second. In a country as thickly populated as China, failure of one crop spells disaster far more complete than in other less densely peopled countries.

The introduction of Western medicine has helped to a small extent. However, until the country is more settled, scientific medicine, hygiene and sanitation cannot hope to reach more than a very small fraction of the people. These because of their terrific poverty cannot really avail themselves of scientific knowledge when it is given them. Even elementary cleanliness is costly and becomes prohibitive when food itself is uncertain and lacking.

Science News-Letter, February 23, 1929

Light on Greek History

Astronomy

Building specifications, contracts, and accounts used by architects who built the famous Greek temples help to interpret happenings in ancient Greece, Prof. Philip H. Davis, of Vassar College, told the Archaeological Institute. Prof. Davis described a careful study of the specifications for the Hall of the Mysteries at the religious center of Eleusis, and showed how, by comparing what the architects planned with what they accomplished, the course of political events in and around Athens can be traced.

This temple was one of great concern to the Greeks because it was the scene of the worship of the earth goddess, Demeter, a widely popular cult. It was burned by the Persians and restored again after these invaders had been driven from Greece. Pericles had the Hall of the Mysteries enlarged and remodeled, and a portico was planned and started. Later, the portico was again an active project, but war with Philip of Macedon interrupted temple building, and when peace came again the plans were altered to a more magnificent scale to fit with a program of prosperity.

Literal ups and downs of the temple shed light on the times of Athenian prosperity and depression, destructive warfare and constructive peace, progressive expansion and tight economy, Prof. Davis' investigation showed.

Science News-Letter, February 23, 1929

Catnip Lures Tomcats

Zoology

Catnip oil, which the United States Government uses in baiting bobcats and mountain lions on Western ranges, is now being employed by ornithologists to lure tomcats to their doom.

Cats, next to hunters, are the greatest destroyers of bird life, Frederick C. Lincoln, in charge of bird-banding operations conducted by the Bureau of Biological Survey, explained here. One of the principal problems facing managers of stations and sanctuaries is keeping them off the premises.

Mr. Lincoln, aware that Tom had pointed the way to the destruction of mountain lions by parading the family weakness for catnip, experimented with the same bait at the bird-banding station he operates near Washington. He found it a potent weapon where tomcats are concerned, but not so successful with tabbies. Call it feminine intuition, what you will, but, he says, lady cats seem to sense danger and have the will power to resist the fatal odor.

There are in the United States approximately 2,500 bird-banding stations, operated by volunteers under permits issued by the Department of Agriculture, at which more than 450,000 birds, representing 231 different species, have been marked in an effort to learn something of their migrations, and other factors relating to their life history.

Science News-Letter, February 23, 1929

Tides Slow Earth

Astronomy

One and a half billion horsepower, the rate at which the tides of the earth expend their energy, are responsible for a slowing of the earth's rotation somewhat less than a thousandth of a second every century. This was the announcement made by Walter D. Lambert, of the U. S. Coast and Geodetic Survey.

The usual conception of the tides causing friction, and so slowing down the earth as the friction of a brake-band slows down a moving wheel is not correct, Mr. Lambert pointed out. It is simply a matter of the dissipation of energy, he said. The earth has a certain amount of energy by virtue of its rotation and mass, and this is given up to be dissipated by the tides.

Mr. Lambert criticised some of the current geological notions. "Geologists say that in past geologic eras there were great areas of shallow seas," he said, "and these would be favorable, as such, to large tidal friction and to a more rapid rate of change in the length of the day with perhaps attendant geologic consequences of interest. But shallow seas alone are not enough to produce tidal friction. There must be oceans alongside capable of producing large tides to sweep across the shallow seas and thus generate tidal friction and dissipate energy."

Science News-Letter, February 23, 1929

CLASSICS OF SCIENCE: Pestalozzi on Education

Education

The father of modern teaching methods, summing up for his friend Greaves in England his principles of child training, points out a goal which our most progressive educators are just beginning to find ways to attain.

LETTERS ON EARLY EDUCATION. Addressed to J P. Greaves, Esq., by Johann Heinrich Pestalozzi, Translated from the German Manuscript. London, 1827.

Letter XXIX.

April 4, 1819.

MY DEAR GREAVES,

The second rule that I would give to a mother, respecting the early development of the infant mind, is this: Let the child not only be *acted upon*, but let him be an *agent* in intellectual education.

I shall explain my meaning: Let the mother bear in mind that her child has not only the faculties of attention to, and retention of, certain ideas or facts, but also a faculty of reflection, independent of the thoughts of others. It is well done to make a child read, and write, and learn, and repeat—but it is still better to make a child THINK. We may be able to turn to account the opinions of others, and we may find it valuable or advantageous to be acquainted with them: we may profit by their light; but we can render ourselves most useful to others, and we shall be entitled to the character of valuable members of society, by the efforts of our own mind; by the result of our own investigations; by those views, and their application, which we may call our intellectual property.

I am not now speaking of those leading ideas, which are from time to time thrown out, and by which science is advanced, or society benefitted at large. I am speaking of that stock of intellectual property, which every one, even the most unpretending individual, and in the humblest walks of life, may acquire. I am speaking of that habit of reflection, which guards against unthinking conduct under any circumstances, and which is always active to examine that which is brought before the mind; that habit of reflection, which excludes the self-sufficiency of ignorance, or the levity of "a little learning"; which may lead an individual to the modest acknowledgment that he knows but little, and to the honest consciousness that he knows that little well. To engender this habit, nothing is so effective, as

JOHANN HEINRICH PESTALOZZI

an early development, in the infant mind, of thought—regular, self-active thought. . . .

If a mother asks for the designation of the subjects which might be profitably used as vehicles for the development of thought, I would answer her, that any subject will do, if it be treated in a manner suitable to the faculties of the child. It is the great art in teaching, never to be at a loss for the choice of an object for the illustration of a truth. There is not an object so trivial, that in the hands of a skilful teacher might not become interesting, if not from its own nature, at least from the mode of treating it. To a child everything is new. The charm of novelty, it is true, soon wears off; and if there is not the fastidiousness of matured years, there is at least the impatience of infancy to contend with. But then there is for the teacher the great advantage of a combination of simple elements, which may diversify the subject without dividing the attention.

If I say that any subject will do for the purpose I mean this to be understood literally. Not only there is not one of the little incidents in the life of a child, in his amusements and recreations, in his relations to his parents and friends and playfellows—but there is not actually anything within the reach of the child's attention, whether it belong to nature, or to the employments and arts of life, that might not be made the object of a lesson, by which some useful knowledge might be imparted, and, which is still more important, by which the child might be familiarized with the habit of thinking on what he sees, and speaking after he has thought.

The mode of doing this is not by any means to talk much *to* a child, but to enter into conversation *with* a child; not to address to him many words, however familiar or well chosen, but to bring him to express himself on the subject; not to exhaust the subject, but to question the child about it, and to let him find out, and correct, the answers. It would be ridiculous to expect that the volatile spirits of an infant could be brought to follow any lengthy explanations. The attention of a child is deadened by long expositions, but roused by animated questions.

Let these questions be short, clear, and intelligible. Let them not merely lead the child to repeat, in the same, or in varied terms, what he has heard just before. Let them excite him to observe what is before him, to recollect what he has learned, and to muster his little stock of knowledge for materials for an answer. Show him a certain quality in one thing, and let him find out the same in others. Tell him that the shape of a ball is called round; and if, accordingly, you bring him to point out other objects to which the same predicament belongs, you have employed him more usefully than by the most perfect discourse on rotundity. In the one instance he would have had to listen, and to recollect; in the other, he has to observe, and to think.

* * *

Johann Heinrich Pestalozzi (1746-1827) as a youth was filled with zeal to help humanity, and came to the conclusion that education, especially for the poor, was the great need of his time. After some experience in conducting a school in his own home, he published, at the age of 35, his story "Leonhard and Gertrude" in which he developed his ideas of teaching children. He became recognized as the foremost authority on education. When he was 53 he was able to establish the school of his plans, at first in Burgdorf, later at Yverdun on Lake Neuchatel. Here he taught Fröbel, the originator of the kindergarten, among other great teachers. Here he continued to expound his principles of education until, at the age of 79, he retired to Neuhof, the scene of his first little experiments in "unfolding the treasures of the infant mind."

FIRST GLANCES AT NEW BOOKS

CHILDREN'S BEHAVIOR AND TEACHERS' ATTITUDES — E. K. Wickman—*Commonwealth Fund* ($2). A statistical and analytical study of how teachers react when children become "problems." The statistical part of the survey deals chiefly with the attitudes of teachers toward various types of undesirable behavior. A discussion of mental hygiene and social factors follows. The psychologist recommends for teachers a more general knowledge of what constitutes normal child behavior, and advocates that they should be instructed so that they can treat behavior problems by dealing with the underlying factors of the child's emotion and experience.

Education—Psychology
Science News-Letter, February 23, 1929

DIGHTON ROCK — Edmund Burke Delabarre — *Walter Neale* ($6). A complete account of the numerous theories that have gathered about the pictographs on the famous Dighton Rock, in Massachusetts. Aside from Prof. Delabarre's scholarly survey of the old material and his entertaining discussions of the Phoenician theory, the Atlantis theory, the Chinese theory, the Lost Tribes of Israel tradition, and what not, he has an original contribution to make. His discovery after all this time of traces of a name, read as Miguel Cortereal, and the date 1511, would seem to solve one of the old Portuguese exploration mysteries and would establish Dighton Rock as the oldest historic record in New England. Supplementary chapters deal with other New England pictographs. There is an unusual chapter in which the psychologist returns to his own profession and appraises his fellow scientists who have worked on the Dighton Rock problem and points out the psychological factors involved.

Archaeology
Science News-Letter, February 23, 1929

GROWTH—William Jacob Robbins, Samuel Brody, Albert Garland Hogan, Clarence Martin Jackson, Charles Wilson Greene—*Yale University Press* ($3). The book comprises five popular lectures on growth. Both animal and plant life are included. Such factors as growing old, nutrition, and form are discussed, as well as psysiological factors regulating normal and pathological growth. The book is well illustrated with plates and charts.

Anatomy—Physiology
Science News-Letter, February 23, 1929

CONQUERING THE AIR—Archibald Williams—*Thomas Nelson & Sons* ($2.). A revision of one of the popular books on the progress of aviation.

Aeronautics
Science News-Letter, February 23, 1929

THE PICTURE BOOK OF FLYING—Frank Dobias—*Macmillan* ($2). The history of aeronautics from Daedalus to today told in brief text and somewhat modernistic art.

Aviation
Science News-Letter, February 23, 1929

PRACTICAL FLIGHT TRAINING—Barrett Studley — *Macmillan* ($5). An air-struck youth starting out to be a pilot needs this book, written by a Navy flight instructor, to transmit to him as well as paper and ink can the fine points of serious flying.

Aviation
Science News-Letter, February 23, 1929

IF YOU WANT TO FLY—Alexander Klemin—*Coward, McCann* ($2.50). Written for boys in dialogue form. A New York University professor of aeronautics administers painlessly to the reader the essential facts of aviation.

Aviation
Science News-Letter, February 23, 1929

THE KRASSIN—Maurice Parijanine —Translated by Lawrence Brown—*Macauley* ($2.50). A thrilling story of the Nobile disaster written without regard for censorous niceties and from a Russian viewpoint. It takes a place on the shelf devoted to the history of Arctic exploration.

Exploration
Science News-Letter, February 23, 1929

PETROLEUM AND COAL—W. T. Thom, Jr. — *Princeton University Press* ($2.50). Full of facts about the great fossil fuels of today and tomorrow, this volume by a former U. S. Geological specialist now on the Princeton faculty is the latest and a readable summary of petroleum and coal.

Geology
Science News-Letter, February 23, 1929

WHAT IS EUGENICS?—Leonard Darwin—*Watts* (7d). The book answers the question of the title in simple, readable language. It is meant for those who are puzzled by such terms as eugenics, heredity, contraception and the like which are now frequently appearing in newspapers and journals.

Eugenics
Science News-Letter, February 23, 1929

SHORT HISTORY OF MEDICINE—Charles Singer—*Oxford* ($3). The author rightfully believes that medical science has reached a position so important that all educated persons should have some knowledge of the subject. The stirring history of the development of this science is told, with emphasis on the modern period, and in simple, untechnical language which the lay reader can understand and enjoy. The book is interestingly illustrated.

Medicine
Science News-Letter, February 23, 1929

RECENT ADVANCES IN CHEMISTRY IN RELATION TO MEDICAL PRACTICE—W. McKim Marriott—*Mosby* ($2.50). Chemical advances in medicine have been bewilderingly rapid in recent years. In recognition of this fact, this book was written as an aid to medical practitioners, but it will be helpful to other scientists as well. The book is not limited to a consideration of those phases of chemistry having an immediate clinical application.

Chemistry—Medicine
Science News-Letter, February 23, 1929

PHYSIOLOGY OF BONE—R. Leriche and A. Policard—*Mosby* ($5). This is the authorized English translation by Sherwood More and J. Albert Key. The book is an important monograph on normal and pathological physiology of bone, written for physicians and surgeons, and having as one of its prime objects the stimulation of further research on the subject.

Medicine
Science News-Letter, February 23, 1929

THE NORMAL DIET—W. D. Sansum—*Mosby* ($1.50). This is the second edition of Dr. Sansum's little book. It gives menus for normal diet and discusses and explains the food requirements of the body.

Nutrition
Science News-Letter, February 23, 1929

DENTAL JURISPRUDENCE—Elmer D. Brothers—*Mosby* ($2.25). The book explains clearly and simply the principles and rules of law which affect the dentist both individually and professionally. It will be equally helpful to the physician, since the principles involved are the same. The author has been presenting this material to classes of dental students in the University of Illinois for many years, and he is also lecturer in the John Marshall Law School, Chicago.

Law—Medicine
Science News-Letter, February 23, 1929

Do You Like To Read?

THROUGH the Reading with a Purpose courses distinguished men and women point the way to a better understanding and appreciation of science, art, literature, history, sociology, philosophy, etc.

A series of some forty booklets have appeared on as many subjects.

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More than a half million of these courses are in use. Planned originally for the individual they have come to be used as study outlines by industries, schools, colleges, study clubs and other groups. Some of the titles follow:

Art

7. Ears to Hear: A Guide for Music Lovers, DANIEL GREGORY MASON
17. Appreciation of Sculpture, LORADO TAFT
21. Pleasure from Pictures, HENRY TURNER BAILEY
23. Architecture, LEWIS MUMFORD

Philosophy and Religion

11. Psychology, EVERETT DEAN MARTIN
12. Philosophy, ALEXANDER MEIKLEJOHN
14. Religion in Everyday Life, WILFRED T. GRENFELL

Biography

3. Ten Pivotal Figures of History, AMBROSE W. VERNON
25. Americans from Abroad, JOHN PALMER GAVIT
31. The Founders of the Republic, CLAUDE G. BOWERS
41. Pivotal Figures of Science, ARTHUR E. BOSTWICK
42. George Washington, ALBERT BUSHNELL HART

Literature

2. English Literature, W. N. C. CARLTON
4. Some Great American Books, DALLAS LORE SHARP
19. The Poetry of Our Own Time, MARGUERITE WILKINSON
24. The Modern Essay, SAMUEL MCCHORD CROTHERS
28. The Modern Drama, BARRETT H. CLARK
33. Twentieth Century American Novels, WILLIAM LYON PHELPS
37. French Literature, IRVING BABBITT

History

3. Ten Pivotal Figures of History, AMBROSE W. VERNON
18. The Europe of Our Day, HERBERT ADAMS GIBBONS
20. The United States in Recent Times, FREDERIC L. PAXSON
26. The French Revolution as Told in Fiction, WILLIAM STEARNS DAVIS
29. The Westward March of American Settlement, HAMLIN GARLAND
31. The Founders of the Republic, CLAUDE G. BOWERS

Science

1. Biology, VERNON KELLOGG
9. The Physical Sciences, E. E. SLOSSON
30. The Stars, HARLOW SHAPLEY
40. Geography, J. RUSSELL SMITH
41. Pivotal Figures of Science, ARTHUR E. BOSTWICK
43. Prehistoric Man, GEORGE GRANT MACCURDY
47. The Human Body and Its Care, MORRIS FISHBEIN

Fiction

26. The French Revolution as Told in Fiction, WILLIAM STEARNS DAVIS
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33. Twentieth Century American Novels, WILLIAM LYON PHELPS

Social Science

5. Economics, WALTON H. HAMILTON
8. Sociology and Social Problems, HOWARD W. ODUM
22. American Education, WILLIAM F. RUSSELL
38. The Young Child, BIRD T. BALDWIN

The courses are available at most libraries. If you can not procure them locally, order from the American Library Association. Cloth, 50c; paper, 35c; post paid. Quantity prices on request.

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